WHAT IS CLAIMED IS:

1. A multi-layer electrode structure comprising a plurality of electrode layers at least composed of a binder made of a macromolecular substance and an electrode material and coated on a current-collecting member, wherein a first electrode layer in contact with said current-collecting member and a second electrode layer in contact with said first electrode layer are formed of different constituents or have different proportions of the same constituent.

2. The multi-layer electrode structure of claim 1 wherein said first electrode layer has a stronger adhesive strength relative to said current-collecting member than said second electrode layer relative to said first electrode layer.

3. The multi-layer electrode structure of claim 1 wherein said first electrode layer has a higher electrical conduction rate than said second electrode layer.

4. A multi-electrode structure according to claim 1 wherein the binder of at least one of said first and second electrode layers comprises an ion-conducting polymer.

5. The multi-layer electrode structure of claim 1 wherein the binder for said electrode layers other than said first electrode layer is a polymer prone to form fibrils.

6. A multi-layer electrode structure according to any of claim 1 through claim 5 so wherein at least one of said electrode layers further includes a powdered electrically-conducting substance.

7. The multi-layer electrode structure of claim 1 wherein said electrode material is a powdered substance selected from ion intercalate-deintercalate materials and

π-conjugated conductive macromolecular materials.

8. The multi-layer electrode structure of claim 7 wherein said electrode substance is a chalcogen compound.

9. The multi-layer electrode structure of claim 8 wherein said chalcogen compound contains composite lithium oxides.

10. The multi-layer electrode structure of claim 9 wherein said composite lithium oxides are of the formula $Li_xNi_yM_{1-y}O_2$, wherein M is at least one or more metallic elements selected from the transition metals and aluminum and $0.05 \leq x \leq 1.10$ and $0.15 \leq y \leq 1.0$.

11. The multi-layer electrode structure of claim 7 wherein said electrode material is selected from lithium metal, lithium metal alloys and carbon.

12. The multi-layer electrode structure of claim 11 wherein said carbon is selected from pyrolitic carbon, pitch coke, graphite, carbon glass and carbonized organic macromolecular compounds.

13. The multi-layer electrode structure of claim 7 wherein said electrode material is coated with an ion-conducting polymer.

14. The multi-layer electrode structure of claim 6 wherein said powdered electrically conducting substance is selected from metal powder and carbon powder.

15. A battery containing a positive electrode and a spaced negative electrode and a liquid or non-liquid electrolyte between said positive and negative electrodes, at least one of said positive and negative electrodes comprising a plurality of electrode layers at least composed of a binder made of a macromolecular substance and an electrode material and coated on a current-collecting member, each of said electrode layers

including a macromolecular substance, wherein a first electrode layer in contact with said current-collecting member and a second electrode layer in contact with said first electrode layer are formed of different constituents or have different proportions of the same constitutent.

16. The battery of claim 15 wherein said first electrode layer has a stronger adhesive strength relative to said current-collecting member than said second electrode layer relative to said first electrode layer.

17. The battery of claim 15 wherein said first electrode layer has a higher electrical conduction rate than said second electrode layer.

18. The battery of any of claims 15, 16, and 17 wherein the binder of at least one of said first and second electrode layers comprises an ion-conducting polymer.

19. The battery of any of claims 15, 16, and 17 wherein each of said positive and negative electrodes comprises said multi-electrode structure.

20. A double-layer capacitor with spaced first and second electrodes and a liquid or non-liquid electrolyte between the said electrodes, at least one of said first and second electrodes comprising a plurality of electrode layers at least composed of a binder made of a macromolecular substance and an electrode material and coated on a current-collecting member, each of said electrode layers including a macromolecular substance, wherein a first electrode layer in contact with said current-collecting member and a second electrode layer in contact with said first electrode layer are formed of different constituents or have different proportions of the same constitutent.

21. The double-layer capacitor of claim 20 wherein said electrode substance is a powered electrically conductive material.

22. The double-layer capacitor of claim 20 wherein the binder of at least one of said first and second electrode layers comprises and ion conducting polymer.

23. The double-layer capacitor of claim 22 wherein said electrode material is a powdered electrically conductive material and said ion conducting polymer coats said particulate electrically conducting material.

24. The double-layer capacitor of claims 21 or 23 wherein said electrically conductive material is carbon.

25. A method of manufacturing a multi-layer electrode structure comprising a plurality of electrode layers coated on a current-collecting member, said method comprising the steps of:

forming a first electrode layer on said current-collecting member by coating a first mixture comprising a macromolecular binder, an electrode substance, and a solvent onto said current-collecting member and drying said first mixture; and

forming a second electrode layer by coating a second mixture containing a macromolecular binder, an electrode substance and a solvent on said first electrode layer and drying said second mixture.

26. The method of claim 25 wherein one or both of said first and second mixtures further contains a powdered electrically-conducting substance.

27. The method of claim 25 comprising applying a third mixture containing a macromolecular binder, electrode substance and solvent onto said second electrode layer and drying said third mixture to form a third electrode layer.

28. The method of any of claims 25, 26, or 27 wherein the electrode material for at least one of said first, second or third mixtures is coated with an ion-conducting

polymer.

29. The method of claims 25, 26, or 27 wherein the molecular binder for at least one of said electrode layers other than said first electrode layer is a polymer easily prone to form fibrils.

30. The method of claim 26 wherein said powdered electrically-conducting substance of said first electrode layer contains electrolytic salts.

31. A multi-layer electrode structure comprised of a plurality of electrode layers at least composed of a binder made of a macromolecular substance and an electrode material coated on a current-collecting member, wherein the first electrode layer formed in contact with the current-collecting member and a second electrode layer formed on the first electrode layer are formed of different constituents and/or have different proportions of the same constituent.

32. A multi-layer electrode structure comprised of a plurality of electrode layers at least composed of a binder made of a macromolecular substance and an electrode material, coated on a current-collecting member, wherein the binder of the first electrode layer formed in contact with the current-collecting member has a stronger adhesive strength than the second electrode layer formed on the first electrode layer.

33. A multi-layer electrode structure comprised of a plurality of electrode layers at least composed of a binder made of a macromolecular substance, an electrode material,

and a powdered electrically-conducting substance coated on a current-collecting member, wherein the first electrode layer formed in contact with a current-collecting member, has a higher electrical conduction rate than the second electrode layer formed on the first electrode layer.

34. The multi-layer electrode structure according to any of claims 31-33, wherein at least one layer of electrode material is adhered by an ion-conducting polymer.

35. The a multi-layer electrode structure according to any of claims 31-33, wherein the macromolecular binder for one electrode layer other than the first electrode layer uses a binder polymer easily prone to form fibrils.

36. A battery containing at least one electrode comprised of a multi-layer electrode structure coated on a current-colleting layer, each layer at least composed of a binder made of a macromolecular substance, an electrode material, and a powdered electrically-conducting substance, wherein the battery further includes a liquid or non-liquid electrolyte between the electrodes, and wherein the first electrode layer formed in contact with a current-collecting member has a binder of stronger adhesive strength and a higher electrical conduction rate than the second electrode layer formed on the first electrode layer.

37. The battery according to claim 36, wherein a binder of the same liquid or non-liquid electrolyte or of a high affinity is utilized in the electrode layer in contact with

the electrolyte.

38. A *double*-layer capacitor with at least one electrode comprised of a multi-layer electrode structure coated on a current-collecting member, each layer at least composed of a binder made of a macromolecular substance, an electrode material, and a powdered electrically-conducting substance, wherein the *double*-layer capacitor further includes a liquid or non-liquid electrolyte between the electrodes, wherein the first electrode layer formed in contact with the current-collecting member has a binder of stronger adhesive strength and a higher electrical conduction rate than the second electrode layer formed on the first electrode layer.

39. The *double*-layer capacitor according to claim 38, wherein a binder of the same liquid or non-liquid electrolyte or of a high affinity is utilized in the electrode layer in contact with the electrolyte.

40. A method of manufacturing a multi-layer electrode structure comprised of a plurality of electrode layers at least composed of a binder made of a macromolecular substance and an electrode material coated on a current-collecting member, the method comprising the steps of forming a first electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, and a solvent onto a current-collecting member and drying the mixed material, forming a second electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, and a solvent on top of the first electrode layer and drying the

mixed material to form an electrode of multiple layers, and wherein the macromolecular binders used are such that the binding strength of the first electrode layer is stronger than the second electrode layer.

41. A method of manufacturing a multi-layer electrode structure comprised of a plurality of electrode layers at least composed of a binder made of a macromolecular substance, an electrode material, and a powdered electrically-conducting substance coated on a current-collecting member, the method comprising the steps of forming a first electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, a solvent, and a powdered electrically-conducting substance onto a current-collecting member and drying the mixed material, forming a second electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, a solvent, and a powdered electrically-conducting substance on top of the first electrode layer and drying the mixed material to form an electrode of multiple layers, and using powdered electrically-conducting substances such that the electrical conduction rate of the first electrode layer is higher than the second electrode layer.

42. The method of manufacturing a multi-layer electrode structure according to claim 40 or 41, wherein a mixed material containing macromolecular binder, electrode substance, and solvent are mixed and coated onto the second electrode layer and drying the mixed material to form an electrode layer such that the third electrode layer has a stronger bonding force than the second electrode layer.

43. The method of manufacturing a multi-layer electrode structure according to any of claim 40-42, wherein the electrode material for at least one electrode layer is coated with an ion-conducting polymer.

44. A method of manufacturing a multi-layer electrode structure comprised of a plurality of electrode layers at least composed of a binder made of a macromolecular substance and an electrode material coated on a current-collecting member, the method comprising the steps of forming a first electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, and a solvent onto a current-collecting member and drying the mixed material, forming a second electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, and a solvent on top of the first electrode layer and drying the mixed material to form an electrode of multiple layers, and wherein the macromolecular binders used are such that the binding strength of the first electrode layer is stronger than the second electrode layer, wherein a mixed material containing macromolecular binder, electrode substance, and solvent are mixed and coated onto the second electrode layer and drying the mixed material to form an electrode layer such that the third electrode layer has a stronger bonding force than the second electrode layer, and the electrode material for at least one electrode layer is coated with an ion-conducting polymer.

45. A method of manufacturing a multi-layer electrode structure comprised of a plurality of electrode layers at least composed of a binder made of a macromolecular

substance, an electrode material, and a powdered electrically-conducting substance coated on a current-collecting member, the method comprising the steps of forming a first electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, a solvent, and a powdered electrically-conducting substance onto a current-collecting member and drying the mixed material, forming a second electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, a solvent, and a powdered electrically-conducting substance on top of the first electrode layer and drying the mixed material to form an electrode of multiple layers, and using powdered electrically-conducting substances such that the electrical conduction rate of the first electrode layer is higher than the second electrode layer, wherein a mixed material containing macromolecular binder, electrode substance, and solvent are mixed and coated onto the second electrode layer and drying the mixed material to form an electrode layer such that the third electrode layer has a stronger bonding force than the second electrode layer, and the electrode material for at least one electrode layer is coated with an ion-conducting polymer

46. The method of manufacturing a multi-layer electrode structure according to any of claim 40-42, wherein the macromolecular binder for at least one electrode layer other than the first electrode layer uses a binder polymer easily prone to form fibrils.

47. A method of manufacturing a multi-layer electrode structure comprised of a plurality of electrode layers at least composed of a binder made of a macromolecular substance and an electrode material coated on a current-collecting member, the

method comprising the steps of forming a first electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, and a solvent onto a current-collecting member and drying the mixed material, forming a second electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, and a solvent on top of the first electrode layer and drying the mixed material to form an electrode of multiple layers, and wherein the macromolecular binders used are such that the binding strength of the first electrode layer is stronger than the second electrode layer, wherein a mixed material containing macromolecular binder, electrode substance, and solvent are mixed and coated onto the second electrode layer and drying the mixed material to form an electrode layer such that the third electrode layer has a stronger bonding force than the second electrode layer, and the macromolecular binder for at least one electrode layer other than the first electrode layer uses a binder polymer easily prone to form fibrils.

48. A method of manufacturing a multi-layer electrode structure comprised of a plurality of electrode layers at least composed of a binder made of a macromolecular substance, an electrode material, and a powdered electrically-conducting substance coated on a current-collecting member, the method comprising the steps of forming a first electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, a solvent, and a powdered electrically-conducting substance onto a current-collecting member and drying the mixed material, forming a second electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, a solvent, and a powdered electrically-conducting substance on top of the

first electrode layer and drying the mixed material to form an electrode of multiple layers, and using powdered electrically-conducting substances such that the electrical conduction rate of the first electrode layer is higher than the second electrode layer, wherein a mixed material containing macromolecular binder, electrode substance, and solvent are mixed and coated onto the second electrode layer and drying the mixed material to form an electrode layer such that the third electrode layer has a stronger bonding force than the second electrode layer, and the macromolecular binder for at least one electrode layer other than the first electrode layer uses a binder polymer easily prone to form fibrils.

49. The method of manufacturing a multi-layer electrode structure according to any of claim 40-42, wherein the powdered electrically-conducting substance of the first electrode layer contains support electrolytic salts.

50. A method of manufacturing a multi-layer electrode structure comprised of a plurality of electrode layers at least composed of a binder made of a macromolecular substance and an electrode material coated on a current-collecting member, the method comprising the steps of forming a first electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, and a solvent onto a current-collecting member and drying the mixed material, forming a second electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, and a solvent on top of the first electrode layer and drying the mixed material to form an electrode of multiple layers, and wherein the macromolecular

binders used are such that the binding strength of the first electrode layer is stronger than the second electrode layer, wherein a mixed material containing macromolecular binder, electrode substance, and solvent are mixed and coated onto the second electrode layer and drying the mixed material to form an electrode layer such that the third electrode layer has a stronger bonding force than the second electrode layer, and the powdered electrically-conducting substance of the first electrode layer contains support electrolytic salts

51. A method of manufacturing a multi-layer electrode structure comprised of a plurality of electrode layers at least composed of a binder made of a macromolecular substance, an electrode material, and a powdered electrically-conducting substance coated on a current-collecting member, the method comprising the steps of forming a first electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, a solvent, and a powdered electrically-conducting substance onto a current-collecting member and drying the mixed material, forming a second electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, a solvent, and a powdered electrically-conducting substance on top of the first electrode layer and drying the mixed material to form an electrode of multiple layers, and using powdered electrically-conducting substances such that the electrical conduction rate of the first electrode layer is higher than the second electrode layer, wherein a mixed material containing macromolecular binder, electrode substance, and solvent are mixed and coated onto the second electrode layer and drying the mixed material to form an electrode layer such that the third electrode layer has a stronger

bonding force than the second electrode layer, and the powdered electrically-conducting substance of the first electrode layer contains support electrolytic salts.

52. A method of manufacturing a battery with at least one electrode comprised of a multi-layer electrode structure at least composed of a binder made of a macromolecular substance, an electrode material, and a powdered electrically-conducting substance coated on a current-collecting member, wherein the battery further comprises a liquid or non-liquid electrolyte between the electrodes, the method comprising forming a first electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, a solvent, and a powdered electrically-conducting substance onto a current-collecting member and drying the mixed material, forming a second electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, a solvent, and a powdered electrically-conducting substance on top of the first electrode layer and drying the mixed material to form an electrode of multiple layers, and using macromolecular binders such that the bonding force of the first electrode layer is stronger than the bonding force of the second electrode layer and using powdered electrically-conducting substances so that the electrical conduction rate of the first electrode layer is higher than the second electrode layer.

53. A method of manufacturing a *double*-layer capacitor with an electrode comprised of a multi-layer electrode structure at least composed of a binder made of a macromolecular substance, an electrode material, and a powdered electrically-conducting substance coated on a current-collecting member, wherein the

double-layer capacitor comprises a liquid or non-liquid electrolyte between the electrodes, the method comprising forming a first electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, a solvent, and a powdered electrically-conducting substance onto a current-collecting member and drying the mixed material, forming a second electrode layer by coating a mixed material containing a macromolecular binder, an electrode substance, a solvent, and a powdered electrically-conducting substance on top of the first electrode layer and drying the mixed material to form an electrode of multiple layers, and using macromolecular binders such that the bonding force of the first electrode layer is stronger than the binding force of the second electrode layer and using powdered electrically-conducting substances such that the electrical conduction rate of the first electrode layer is higher than that of the second electrode layer.